Section 15
Area 13 - Solid Pitch Unloading and Carbon Plant Storage Drainage Area

The Solid Pitch Unloading area is located in the northwest corner of the facility. The Carbon Plant Storage area is located on the north end of the Reduction Plant. Both areas are illustrated on Plate 2. These two areas were identified during USEPA's November 1996 site visit as having potential hazardous constituent migration by storm water runoff. Storm water from both areas drains to an area of the plant site identified in the storm water permit application as "overland flow and infiltration." Storm water runoff from both the Solid Pitch Unloading area and the Carbon Plant Storage area passes through this area as it flows toward the Ohio River. The solid pitch unloading area was part of the original plant construction in the late 1950s. Its use remained consistent from that time until April 1999, when liquid pitch replaced the use of solid pitch. The Carbon Plant Storage area north of the Carbon Plant stores "green" and baked anodes. Out-of-use equipment and building materials have also been stored in this area. The anode storage area is now covered. Unused and used hydraulic oil are stored in tanks within a containment structure in this area. Runoff from the Carbon Plant Storage Area drains across the upper terrace to a culvert under the railroad track. Runoff from the Pitch Unloading Area drains northward between two sets of railroad tracks to a culvert under the western track. Previously, drainage continued through another culvert to the middle terrace. This culvert is currently blocked with soil. Once passing through the first culvert, storm water runoff drains northward between the two western-most tracks where it appears to infiltrate into the soils. Some infiltrating storm water is still discharged to the middle terrace through the blocked culvert.

15.1 RFI Sampling and Analysis Program

The goal of sampling in the Solid Pitch Unloading and Carbon Plant Storage areas was to assess whether hazardous constituents have migrated from these areas via storm water runoff. Four soil borings, designated SB-1301 through SB-1304 on Figure 15-1, were initially drilled and sampled in this area. Boring SB-1301 was a surface soil sample located along the railroad in an area unaffected by storm water runoff from either the carbon plant or the Pitch unloading activities. This sample was analyzed for Appendix IX SVOCs to provide background concentrations for PAHs associated with railroad construction and activities. SB-1302 was located in a depositional area along the storm water flow path from the Carbon Plant Storage area. Samples from this boring were collected at 0 feet to 0.5 feet and 3 feet to 3.5 feet below

land surface and were analyzed for Appendix IX SVOCs and RCRA metals. SB-1304 was located at the northwest corner of the pitch unloading building. This location is within the raw material receiving area in which some solid pitch is present on the ground surface. Samples were collected at 3 feet to 5 feet and 8 feet to 10 feet below grade and analyzed for Appendix IX SVOCs. Analyses on the 8-foot to 10-foot sample were conducted on a quick-turn basis to assess the need for collection of deeper samples. SB-1303 was located within the storm water drainage path from the solid pitch unloading area on the east side of a culvert that discharges to the west side of the tracks. Samples from this boring were collected at 0 feet to 0.5 feet, 3 feet to 5 feet, and 8 feet to 10 feet below grade. Samples from 0 feet to 0.5 feet and 3 feet to 5 feet were analyzed for Appendix IX SVOCs on a quick-turn basis. The 8-foot to 10-foot sample was held pending the results of the quick-turn analyses.

Preliminary screening of the quick-turn SVOC results found some PAHs at concentrations above conservative preliminary screening levels. The surface soil sample from boring SB-1303 exceeded preliminary screening levels, while the 3-foot to 5-foot sample did not. The 8-foot to 10-foot sample from boring SB-1304 also exceeded preliminary screening levels.

Based on the preliminary screening results, an additional sample was collected from SB-1304 at 18 feet to 20 feet below grade to assess potential vertical migration of hazardous constituents present in the solid pitch. The approved workplan stated that an additional surface soil sample would be collected in the direction of storm water drainage if the surface sample from boring SB-1303 exceeded preliminary screening values. From SB-1303, storm water drains under one set of railroad tracks, then flows northward between the tracks where it eventually infiltrates the ground. Some infiltrated water is discharged to the middle terrace through a second culvert that has been blocked with soil. Surface soils along the tracks north of the solid pitch unloading building contain visible evidence of pitch, deposited either by storm water runoff or by spillage from the railcars. In order to assess the extent of PAHs associated with storm water runoff, an additional surface soil sample, designated SB-1305 on Figure 15-1, was collected from the middle terrace west of the blocked drainage culvert. This sample was analyzed for Appendix IX SVOCs.

Conservative preliminary screening of the SVOC results from the additional samples plus the samples collected from borings SB-1301 and SB-1302 indicated PAHs present in each surface soil sample and two of the subsurface soil samples at levels above the conservative preliminary screening levels. Four additional surface soil samples, designated SS-1306 through SS-1309 and shown in Figure 15-1, were collected in October 1997 and analyzed for PAHs to assess the horizontal extent of PAHs above the preliminary screening levels. Conservative preliminary screening levels were again exceeded. Three more surface soil samples, designated SS-1310 through SS-1312 and shown in Figure 15-1, were collected in May 1998 and analyzed for PAHs.

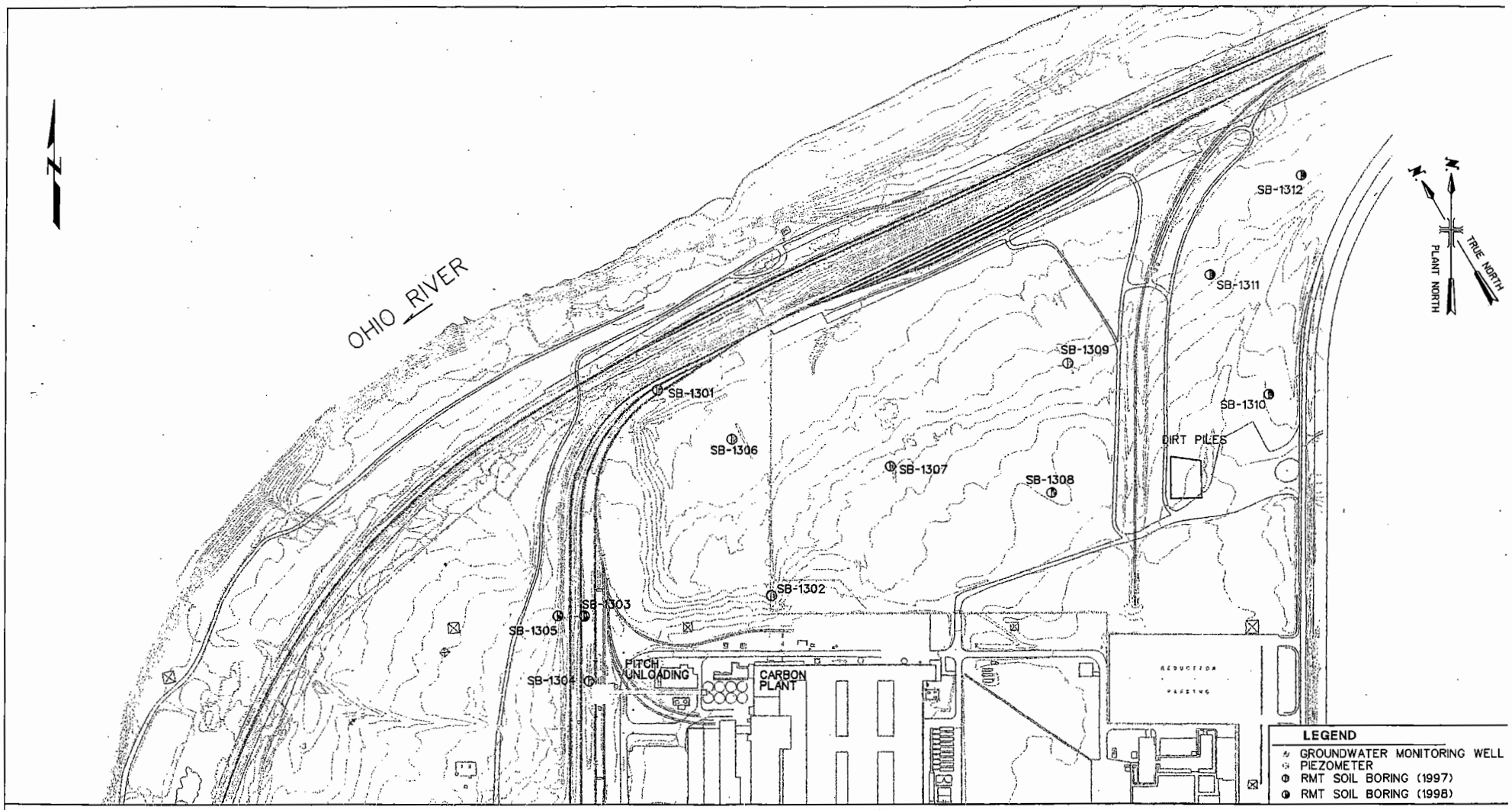
Benzo(a)pyrene slightly exceeded its conservative preliminary screening level in SS-1310, but it was mutually agreed with USEPA that the overall horizontal extent of PAHs was sufficiently defined. Additionally, as discussed in Section 3, PAH concentrations in the range detected in SS-1310, SS-1311, and SS-1312 have been detected near highways in areas remote from industrial activities. Therefore, the PAH concentrations in these samples may be related to their location near the access road rather than industrial activities. Table 15-1 and Table 15-2 summarize the sampling results in Area 13.

PAHs exceeding screening levels are limited to the surface and shallow subsurface soils within Area 13. The vertical extent of PAHs is defined by the absence of SVOCs in the 3-foot to 5-foot and 8-foot to 10-foot samples from SB-1303 and the 18-foot to 20-foot sample from SB-1304. The aerial extent of PAHs was assessed through the collection of four additional surface soil samples across the northern portion of the property. The locations of these samples, designated SB-1306 through SB-1309, are illustrated on Figure 15-1. Each of these samples was collected from topographically elevated areas, away from drainage features. The goal of this sampling was to assess whether the PAHs are limited to the storm water drainage features.

PAHs in several samples in Area 13 exceed GISLs and SSLs. The PAHs are not migrating vertically through the soil, as demonstrated by vertical concentration profiles at SB-1302, SB-1303, SB-1304, and SB-1306. A site-specific human health risk assessment for various exposure scenarios in Area 13 is provided in Section 22. The risk assessment concludes that acceptable risk levels are not exceeded under the current industrial use, construction, and trespasser scenarios. However, the less conservative end of the acceptable risk range is exceeded for the future industrial land use scenario. The exceedence of the acceptable risk range can be attributed to the PAH concentrations detected at SB-1302.

15.2 Summary of Findings for Area 13

- Metal concentrations in this area are within the background range.
- PAHs are present in surface soils at levels exceeding generic industrial screening levels and SSLs. No other organic constituents were detected.
- PAHs are constituents in solid pitch, which is managed in this area. PAHs are also typically found in the vicinity of railroad tracks and paved roads, regardless of specific industrial activities.
- A site-specific risk assessment was deemed appropriate for this area. The risk assessment is presented in Section 22. Several exposure scenarios were evaluated, and the less conservative end of the acceptable risk range was exceeded for future industrial use of the area.



0 300
SCALE IN FEET

FIGURE 15-1
SOIL SAMPLING LOCATIONS
AREA 13
CARBON PLANT AND PITCH UNLOADING
STORMWATER DRAINAGE AREA

CENTURY ALUMINUM
OF WEST VIRGINIA
RAVENSWOOD, WV

RMT 70410.73
1299

/usr3/hydro/7041026h/prop13-2.dgn
MCP 12-14-99

Table 15-1
Summary of Organic Constituents
Area 13 - Solid Pitch Unloading and Carbon Plant Storage Drainage Area

PARAMETER (mg/kg)	GENERIC INDUSTRIAL SCREENING LEVEL [1]	MIGRATION TO GROUNDWATER [2]	LOCATION/DEPTH/SAMPLE DATE						
			SB-1301	SB-1302			SB-1303		
			0 - 0.5'	0 - 0.5'	3 - 3.5'	(DU-1334) 3 - 3.5'	0 - 0.5'	3 - 5'	8 - 10'
			8/21/97	8/21/97			8/19/97		
SEMIVOLATILE ORGANICS									
Naphthalene	4,100	84	<24	<21	<0.37	<0.38	8.6 J	<0.38	<0.37
Acenaphthene	12,000	570	41	18 J	<0.37	<0.38	61	<0.38	<0.37
Dibenzofuran	820	0.79 [a]	<24	<21	<0.37	<0.38	**9.6 J**	<0.38	<0.37
Fluorene	8,200	560	<24	<21	<0.37	<0.38	22 J	<0.38	<0.37
Phenanthrene	61,000 [b]	1,012 [a,b]	120	63	0.37	0.61	290 j	<0.38	<0.37
Anthracene	61,000	12,000	36	19 J	<0.37	<0.38	82 j	<0.38	<0.37
Fluoranthene	8,200	4,300	190	100	0.93	1.1	460 D	<0.38	<0.37
Pyrene	6,100	4,200	170	110	0.76	1.1	400 D	<0.38	<0.37
Benzo(a)anthracene	7.8	2	**160**	**99**	0.7	0.94	**380 D**	<0.38	<0.37
Chrysene	780	160	140	100	0.74	0.97	**380 D**	<0.38	<0.37
Benzo(b)fluoranthene	7.8	5	**130**	**95**	0.64	0.86	**390 D**	<0.38	<0.37
Benzo(k)fluoranthene	78	49	**120**	**91**	0.7	0.89	**360**	<0.38	<0.37
Benzo(a)pyrene	0.78	8	**200**	**140**	0.93	1.3	**520 D**	<0.38	<0.37
Indeno(1,2,3-cd)pyrene	7.8	14	**170**	**120**	0.82	1.1	**360 D**	<0.38	<0.37
Dibenz(a,h)anthracene	0.78	2	<24	**44**	0.3 J	<0.38	**250**	<0.38	<0.37
Benzo(g,h,i)perylene	78 [b]	286 [a,b]	190	140	0.91	1.3	**390 D**	<0.38	<0.37

[1] USEPA Region III Risk-Based Concentration for Industrial Soils dated October 1, 1998 (Risk Target = 10^{-6}; Hazard Quotient = 0.1).

[2] USEPA Soil Screening Guidance - Technical Background Document (SSG-TBD), May 1996, DAF = 20.

[a] Calculated using SSG-TBD, Eqn. 22.

[b] Surrogate compounds (see Chpt. 3.2.2) used to develop screening levels.

D - Quantified at secondary dilution factor.

J - Present below nominal reporting limit.

j - Concentration considered an estimate based on data validation.

Shading indicates concentration exceeds the generic industrial screening level.

Bold text indicates concentration exceeds the migration to groundwater SSL.

Table 15-1
Summary of Organic Constituents
Area 13 - Solid Pitch Unloading and Carbon Plant Storage Drainage Area

PARAMETER (mg/kg)	GENERIC INDUSTRIAL SCREENING LEVEL [1]	MIGRATION TO GROUNDWATER [2]	LOCATION/DEPTH/SAMPLE DATE						
			SB-1304			SB-1305	SB-1306		SB-1307
			3 - 5'	8 - 10'	18 - 20'	0 - 0.5'	0 - 0.5'	(DU-1337) 0 - 0.5'	0 - 0.5'
			8/19/97		8/23/97	8/26/97	10/14/97		10/14/97
SEMIVOLATILE ORGANICS									
Naphthalene	4,100	84	<0.37	<0.37	<0.59	<1.9	<2	<2	0.24 J
Acenaphthene	12,000	570	<0.37	<0.37	<0.59	<1.9	0.72 J	0.52 J	2.5
Dibenzofuran	820	0.79 [a]	<0.37	<0.37	<0.59	<1.9	<2	<2	0.36 J
Fluorene	8,200	560	<0.37	<0.37	<0.59	<1.9	0.22 J	<2	0.69 J
Phenanthrene	61,000 [b]	1,012 [a,b]	<0.37	0.64	<0.59	1.6 J	3.1	2.2	11
Anthracene	61,000	12,000	<0.37	0.19 J	<0.59	0.49 J	0.76 J	0.53 J	2.3
Fluoranthene	8,200	4,300	<0.37	1.2	<0.59	3.6	7.1	4.9	24 D
Pyrene	6,100	4,200	<0.37	1.2	<0.59	2.8	6.1	4.3	21 D
Benzo(a)anthracene	7.8	2	<0.37	1.1	<0.59	**2.6**	**4.7**	**3.4**	**15 D**
Chrysene	780	160	<0.37	1.1	<0.59	2.8	5.1	3.6	18 D
Benzo(b)fluoranthene	7.8	5	<0.37	1.1	<0.59	3	**6.4**	4.8	**26 D**
Benzo(k)fluoranthene	78	49	<0.37	1.1	<0.59	2.8	5.7	4.1	18 D
Benzo(a)pyrene	0.78	8	<0.37	1.6	<0.59	3.6	7.1	5.3	**24D**
Indeno(1,2,3-cd)pyrene	7.8	14	<0.37	1.3	<0.59	2.9	3.5	2.5	11
Dibenz(a,h)anthracene	0.78	2	<0.37	0.48	<0.59	1 J	1.3 J	0.63 J	**4.2**
Benzo(g,h,i)perylene	78 [b]	286 [a,b]	<0.37	1.3	<0.59	3	3.3	2.5	10

[1] USEPA Region III Risk-Based Concentration for Industrial Soils dated October 1, 1998 (Risk Target = 10^{-6}; Hazard Quotient = 0.1).

[2] USEPA Soil Screening Guidance - Technical Background Document (SSG-TBD), May 1996, DAF = 20.

[a] Calculated using SSG-TBD, Eqn. 22.

[b] Surrogate compounds (see Chpt. 3.2.2) used to develop screening levels.

D - Quantified at secondary dilution factor.

J - Present below nominal reporting limit.

j - Concentration considered an estimate based on data validation.

Shading indicates concentration exceeds the generic industrial screening level.

Bold text indicates concentration exceeds the migration to groundwater SSL.

Table 15-1
Summary of Organic Constituents
Area 13 - Solid Pitch Unloading and Carbon Plant Storage Drainage Area

PARAMETER (mg/kg)	GENERIC INDUSTRIAL SCREENING LEVEL [1]	MIGRATION TO GROUNDWATER [2]	LOCATION/DEPTH/SAMPLE DATE				
			SB-1308	SB-1309	SB-1310	SB-1311	SB-1312
			0 - 0.5'	0 - 0.5'	0 - 0.5'	0 - 0.5'	0 - 0.5'
			10/14/97	10/14/97	05/28/98	05/28/98	05/28/98
SEMIVOLATILE ORGANICS							
Naphthalene	4,100	84	<1.9	<1.9	<0.36	<0.36	<0.40
Acenaphthene	12,000	570	0.86 J	0.35 J	<0.36	<0.36	<0.40
Dibenzofuran	820	0.79 [a]	<1.9	<0.19	<0.36	<0.36	<0.40
Fluorene	8,200	560	0.26 J	<0.19	<0.36	<0.36	<0.40
Phenanthrene	61,000 [b]	1,012 [a,b]	4	1.7 J	0.51	0.23J	0.29J
Anthracene	61,000	12,000	0.92 J	0.37 J	<0.36	<0.36	<0.40
Fluoranthene	8,200	4,300	11	4	1.3	0.48	0.57
Pyrene	6,100	4,200	9	3.6	1.2	0.46	0.52
Benzo(a)anthracene	7.8	2	**7.5**	**2.9**	1.0	0.37	0.41
Chrysene	780	160	8.5	3.3	1.2	0.43	0.48
Benzo(b)fluoranthene	7.8	5	**14**	4.7	1.7	0.57	0.6
Benzo(k)fluoranthene	78	49	8.3	3.4	1.1	0.43	0.41
Benzo(a)pyrene	0.78	8	**11**	4.5	1.6	0.56	0.56
Indeno(1,2,3-cd)pyrene	7.8	14	6.6	2.7	0.97	0.35J	0.34J
Dibenz(a,h)anthracene	0.78	2	**2.5**	0.57 J	0.36J	<0.36	<0.40
Benzo(g,h,i)perylene	78 [b]	286 [a,b]	7	2.8	1.0	0.36	0.35J

[1] USEPA Region III Risk-Based Concentration for Industrial Soils dated October 1, 1998 (Risk Target = 10^{-6}; Hazard Quotient = 0.1).

[2] USEPA Soil Screening Guidance - Technical Background Document (SSG-TBD), May 1996, DAF = 20.

[a] Calculated using SSG-TBD, Eqn. 22.

[b] Surrogate compounds (see Chpt. 3.2.2) used to develop screening levels.

D - Quantified at secondary dilution factor.

J - Present below nominal reporting limit.

j - Concentration considered an estimate based on data validation.

Shading indicates concentration exceeds the generic industrial screening level.

Bold text indicates concentration exceeds the migration to groundwater SSL.

Table 15-2
Summary of Inorganic Constituents
Area 13 - Solid Pitch Unloading and Carbon Plant Storage Drainage Area

PARAMETER (mg/kg)	SITE BACKGROUND [1]	GENERIC INDUSTRIAL SCREENING LEVEL [2]	MIGRATION TO GROUNDWATER [3, 4]	LOCATION/DEPTH/SAMPLE DATE		
				SB-1302		
				0 - 0.5'	3 - 3.5'	(DU-1334) 3 - 3.5'
				08/21/97		
Arsenic	16	38 [a]	29	7.3	7.6	11
Barium	230	14,000	1,600	73	64	92
Chromium	22	610 [b]	38 [b]	14	12	16
Lead	20	400 [c]	NA	19	11	15

[1] Site Background is 2x the mean of the site background samples (see Chpt. 3.2.4).

[2] USEPA Region III Risk-Based Concentration for Industrial Soils dated October 1, 1998 (Risk Target = 10^{-6}; Hazard Quotient = 0.1).

[3] USEPA Soil Screening Guidance - Technical Background Document, May 1996, DAF = 20.

[4] SSL for pH of 6.8.

[a] USEPA Region III Risk-Based Concentration for arsenic in industrial soils based on a target risk of 10^{-5}.

[b] The GISL and SSL for chromium are based on the values for hexavalent chromium.

[c] A screening level of 400 mg/kg has been set for lead based on *Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities* (USEPA, 1994).

Shading indicates concentration exceeds both Site Background and the generic industrial screening level.

Bold text indicates concentration exceeds both Site Background and the migration to groundwater SSL.

Section 16
Area 14 - Subsurface Debris Area

The Subsurface Debris Area is located within Area 6, west of Oil Recovery Pond 2 as illustrated on Plate 3. Area 14 is also within the fence surrounding the Oil Recovery Ponds. In June 1997, during trenching for construction of a pipeline associated with upgrading the wastewater treatment plant, a section of trench was discovered to contain debris. The debris included scrap metal that appeared to be collector bars from monolithic pot manufacture, refractory brick, and carbon. USEPA was promptly notified of this discovery by telephone. Based on inquiries about this material made both internally and to the previous owner, this debris may have been used as fill to improve access to well F-7 during the late 1970s.

The northern and southern boundaries of the debris area were identified within the construction trench. The eastern boundary of the debris area is limited by Oil Recovery Pond 2. The western boundary, although limited by Interceptor Basin 002, was not identified. At the south end of the construction trench, the non-soil material was found at depths from 0.5 feet to 2 feet below land surface for a distance of about 30 feet. At the north end, the non-soil material started at a depth of 2 feet and extended below the bottom of the 4-foot deep trench for a distance of about 60 feet.

16.1 Previous Investigations

CAWV collected five samples of the buried debris. Three composite samples (designated Ditch #1 through Ditch #3) were analyzed for RCRA metals and total cyanide. The remaining two samples (designated Pond 2W/DI and Pond 2W/DII) were analyzed for Appendix IX VOCs and SVOC. Approximate sample locations are illustrated on Figure 16-1. Laboratory results are summarized on Table 16-1 and Table 16-2. Cyanide was not detected in the samples; therefore, spent potliner is not likely among the buried materials. Chromium was detected in two of the waste samples at levels above the migration to groundwater screening level for hexavalent chromium; one sample, Ditch #1, also exceeded the generic industrial screening level for hexavalent chromium. One PAH, benzo(a)pyrene, was detected above the generic industrial screening level but below its SSL. The detection of PAHs is consistent with the identification of some buried material as carbon from the anode plant. VOCs were not detected.

The results of this sampling were submitted to USEPA in correspondence dated July 21, 1997. Based on the constituents present, USEPA required CAWV to include the Buried Debris Area in the RFI. In correspondence dated August 4, 1997, CAWV submitted a supplement to the Approved 1997 RFI Workplan describing proposed trenching and sampling activities for Area 14.

16.2 RFI Excavation and Sampling

Two exploratory trenches were excavated in August 1997, beginning near the original north-south oriented construction trenches and continuing to the west until the extent of buried debris was identified. The locations of the exploratory trenches are illustrated on Figure 16-1. The western extent of the buried debris was identified in Trench 1, approximately 37 feet west of the original construction trenches. Buried debris was not present in exploration Trench 2. Figure 16-2 illustrates the approximate lateral and vertical extent of buried debris in Area 14. The area occupied by buried debris is estimated to be about 4,000 square feet.

One sample of buried debris (designated WS-01) and one soil sample (designated SB-1401) were collected from exploration Trench 1. The soil sample was collected approximately 2 feet below the bottom of the buried material. Although no buried debris was present in exploration Trench 2, one soil sample (designated SB-1402) was collected from a depth of approximately 2 feet below ground surface. Figure 16-1 illustrates the sample locations.

Soil and debris samples were collected from the sidewall of each excavation using a hand auger in accordance with the procedures outlined in Appendix A of the approved workplan. Samples were thoroughly homogenized in stainless steel bowls prior to filling sample containers. Samples were placed in a cooler with ice and transported to the laboratory for analyses.

16.3 Discussion of Analytical Results

Soil and buried material samples were analyzed for Appendix IX SVOCs and RCRA metals. Laboratory results are included on Table 16-3 and Table 16-4.

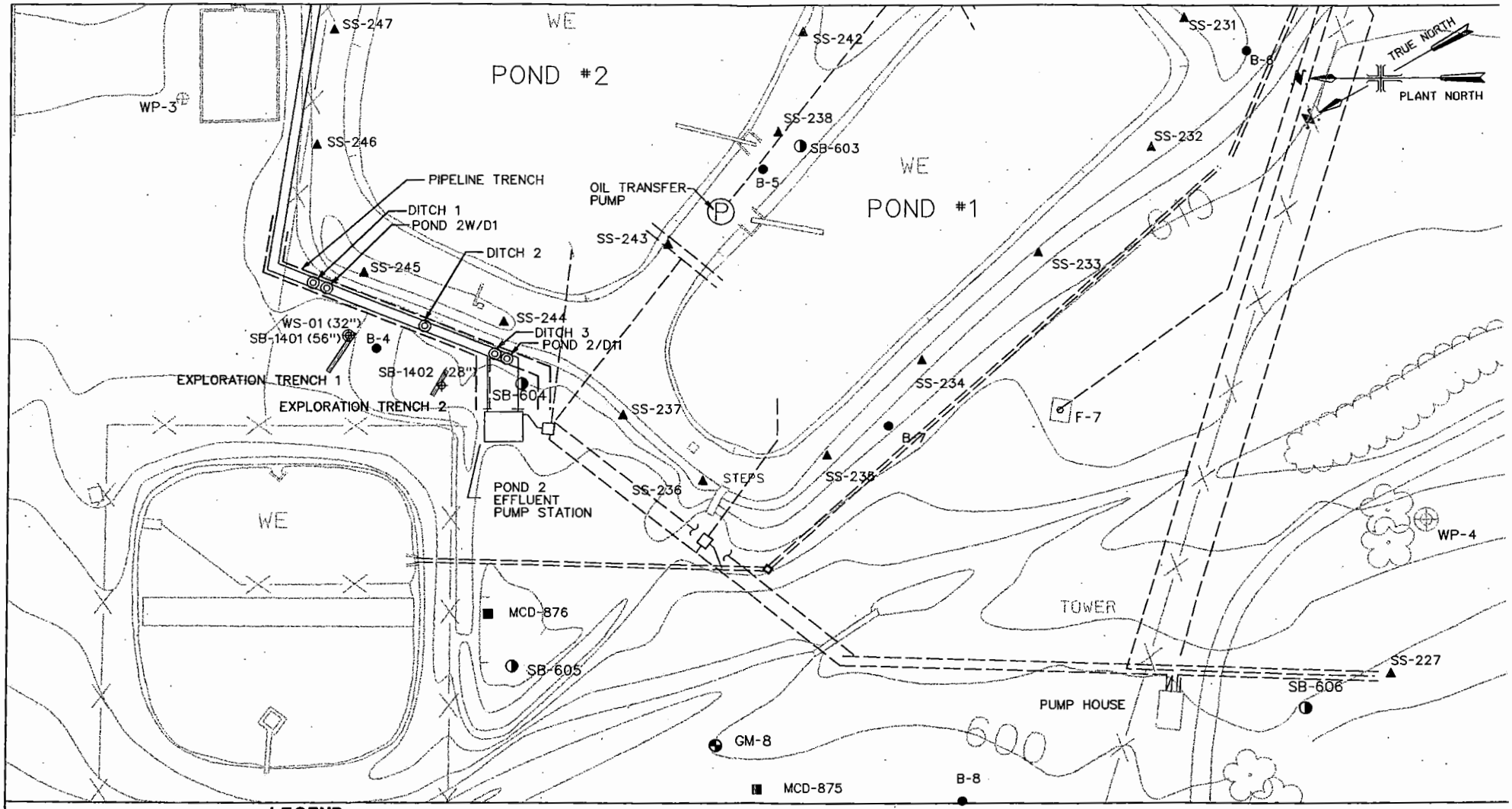
Chromium was detected in waste sample WS-01 at a level above the migration to groundwater screening level for hexavalent chromium; this concentration did not exceed the generic industrial screening level. As discussed in Section 3, the chromium is unlikely to be in the more mobile hexavalent state. Benzo(a)anthracene was also detected in waste sample WS-01 above its SSL but below its GISL. Benzo(a)pyrene was detected in the waste sample above its GISL but below its SSL.

Soil sample SB-1401 was collected 2 feet below the bottom of the buried debris. This sample did not contain detectable levels of SVOCs, and metals concentrations were within site background levels. These data indicate that the constituents present in the buried debris have not migrated to the underlying soils.

A site-specific risk assessment for benzo(a) pyrene in this area is provided in Section 22. The risk assessment concludes that acceptable risk levels are not exceeded under a construction exposure scenario.

16.4 Findings and Conclusions for Area 14

- Total chromium was detected in the sample of the buried debris at a level above the SSL for hexavalent chromium. Benzo(a) anthracene was also detected in the debris sample above its SSL. These constituents were below their respective GISLs.
- Soil beneath the buried debris did not contain detectable levels of SVOCs, and metals were within background levels. These data indicate that constituents present in the buried debris are not migrating.
- Benzo(a)pyrene was detected in the debris at a concentration above its generic industrial screening level. This constituent is included in the human health risk assessment presented in Section 22. The risk assessment concludes that acceptable risk levels are not exceeded.
- No further action in Area 14 is warranted.



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SCALE IN FEET

LEGEND

- GROUNDWATER MONITORING WELL
- PIEZOMETER
- INACTIVE PLANT WATER SUPPLY WELL
- VERSAR SOIL SAMPLES (1987)
- ITC SOIL SAMPLES (1988)
- WESTON SOIL SAMPLES (1988)
- RMT SOIL BORING (1995)
- WASTE SAMPLE LOCATION AND DEPTH (INCHES) BELOW GRADE
- UNDERLYING SOIL SAMPLE AND DEPTH (INCHES) BELOW GRADE

ALL VERSAR, ITC, AND WESTON SOIL SAMPLE LOCATIONS AND TRENCH SAMPLE LOCATIONS ARE APPROXIMATE.

NOTE:
AREA SHOWN ON THIS MAP IS WITHIN THE PECHINEY PROPERTY BOUNDARY

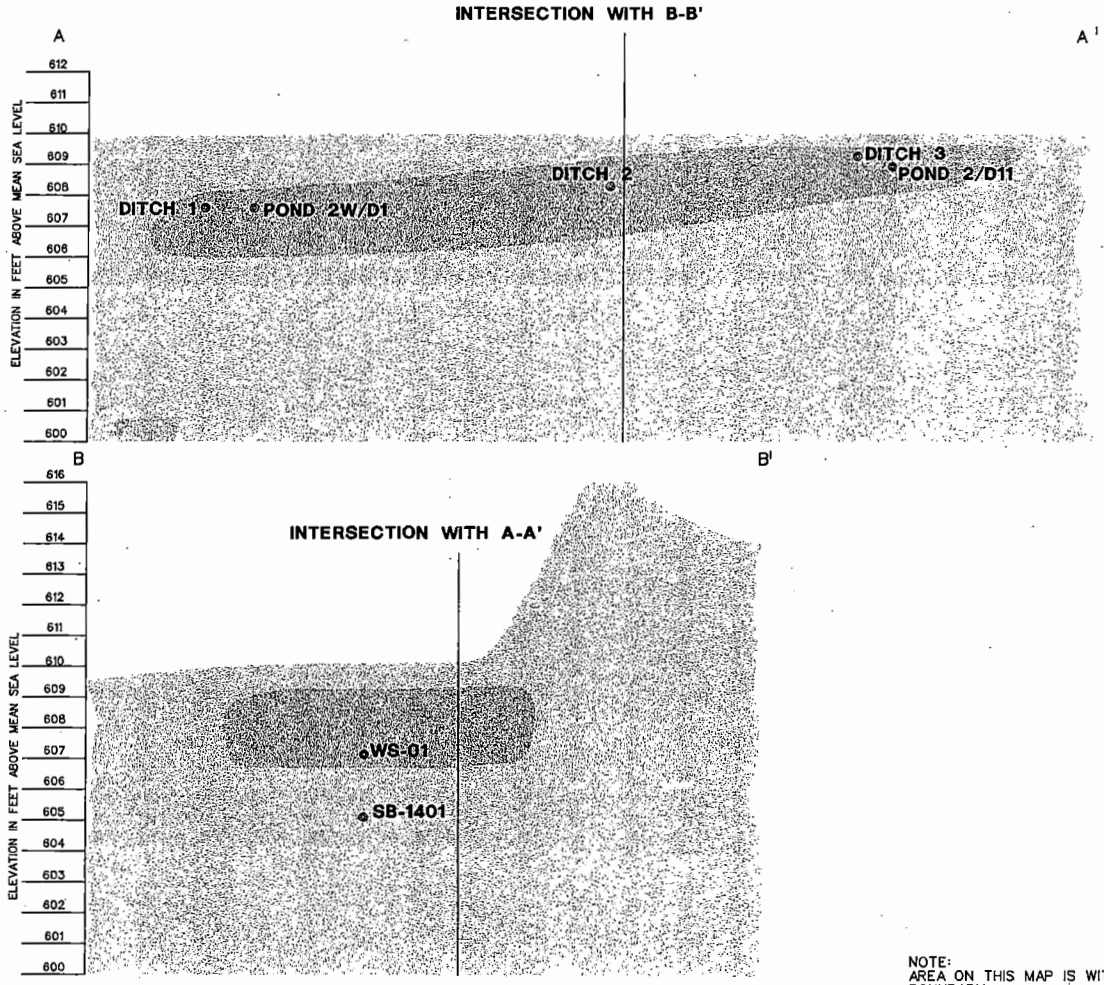
RMT 70410.73 1299

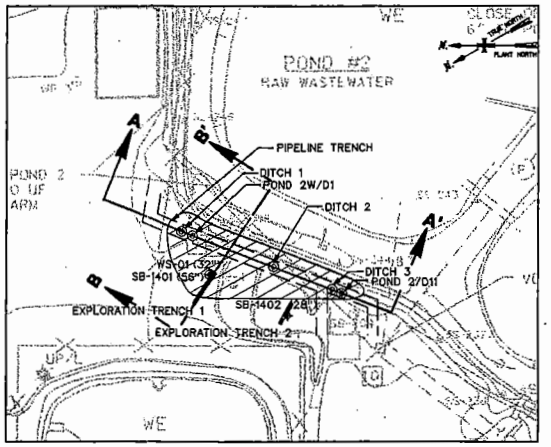
FIGURE 16-1

TRENCHING AND SAMPLING LOCATIONS IN AREA 14

CENTURY ALUMINUM OF WEST VIRGINIA RAVENSWOOD, WV

K:/USR3/HYDRO/70410H/7041026/TRENCH3D.DGN
MCP 12-14-99





LEGEND

- CROSS SECTION
- APPROXIMATE SAMPLE LOCATION
- APPROXIMATE TRENCH LOCATION
- APPROXIMATE EXTENT OF BURIED MATERIAL
- BURIED MATERIAL
- SILTY CLAY (CL) DRY, BROWN TO REDDISH-BROWN
- SANDY SILT (ML) FINE GRAINED, DRY, LOOSE, BROWN TO REDDISH-BROWN

NOTE:
AREA ON THIS MAP IS WITHIN THE PECHINEY PROPERTY BOUNDARY.

0 20
SCALE IN FEET

FIGURE 16-2

CROSS SECTIONS THROUGH AREA 14

CENTURY ALUMINUM
OF WEST VIRGINIA
RAVENSWOOD, WV

RMT 70410.73
1299

K:/USR3/HYDRO/70410H/7041026/NEW2SECT.DGN
MCP 12-14-99

Table 16-1
Summary of Preliminary Metals Analyses
Area 14 – Subsurface Debris Area

CONSTITUENT	ANALYTICAL RESULTS		
	DITCH #1	DITCH #2	DITCH #3
Cyanide	<0.83	<0.70	<0.60
Arsenic	<1.7	7.0	7.9
Barium	110	250	130
Cadmium	<4.2	3.5	1.7
Chromium	1,700	97	68
Lead	160	250	76
Mercury	<0.42	<0.35	0.79
Selenium	<1.7	0.56	0.49
Silver	<3.3	<2.8	<2.4

Table 16-2
Summary of Preliminary Organics Analyses
Area 14 – Subsurface Debris Area

CONSTITUENT	ANALYTICAL RESULTS	
	POND 2/D1	POND 2/D2
Anthracene	0.48	<0.46
Benzo(a)anthracene	1.3	0.49
Benzo(b)fluoranthene	1.4	0.61
Benzo(k)fluoranthene	1.2	0.41
Benzo(ghi)perylene	1.0	0.41
Benzo(a)pyrene	1.4	0.48
Chrysene	1.4	0.58
Dibenz(ah)anthracene	0.37	<0.46
Fluoranthene	2.6	1.8
Fluorene	0.29	<0.46
Indeno(1,2,3-cd)pyrene	0.96	0.39
Phenanthrene	1.6	0.99
Pyrene	2.1	1.1
bis(2-Ethylhexyl)phthalate	<0.45	0.85

Table 16-3
Summary of Organic Constituents
Area 14 - Subsurface Debris Area

PARAMETER (mg/kg)	GENERIC INDUSTRIAL SCREENING LEVEL [1]	MIGRATION TO GROUNDWATER [2]	LOCATION/DEPTH/SAMPLE DATE		
			SOIL SAMPLES		DEBRIS SAMPLE
			SB-1401	SB-1402	WS-01
			56"	28"	32"
			08/22/97	08/22/97	08/22/97
SEMIVOLATILE ORGANICS					
Acenaphthene	12,000	570	<0.39	<0.38	0.26 Jj
Fluorene	8,200	560	<0.39	<0.38	0.36 Jj
Phenanthrene	61,000 [a]	1,012 [a,b]	<0.39	<0.38	3.3 j
Anthracene	61,000	12,000	<0.39	<0.38	1 j
Fluoranthene	8,200	4,300	<0.39	<0.38	4.2 j
Pyrene	6,100	4,200	<0.39	<0.38	3.2
Benzo(a)anthracene	7.8	2	<0.39	<0.38	**2.2**
Chrysene	780	160	<0.39	<0.38	2.4
Benzo(b)fluoranthene	7.8	5	<0.39	<0.38	1.7
Benzo(k)fluoranthene	78	49	<0.39	<0.38	1.5
Benzo(a)pyrene	0.78	8	<0.39	<0.38	2.1
Indeno(1,2,3-cd)pyrene	7.8	14	<0.39	<0.38	1.7
Dibenz(a,h)anthracene	0.78	2	<0.39	<0.38	0.64
Benzo(g,h,i)perylene	78 [a]	286 [a,b]	<0.39	<0.38	1.8

[1] USEPA Region III Risk-Based Concentration for Industrial Soils dated October 1, 1998 (Risk Target = 10^{-6}; Hazard Index = 0.1).

[2] USEPA Soil Screening Guidance - Technical Background Document (SSG-TBD), May 1996, DAF = 20.

[a] Surrogate compound (see Chpt. 3.2.2) used to develop screening levels.

[b] Calculated using SSG-TBD, Eqn. 22.

J - Present below nominal reporting limit.

j - Concentration considered an estimate based on data validation.

< - Concentration less than the Quantitation Limit or not validated if accompanied by "u" qualifier.

NA - Not available

Shading indicates concentration exceeds the generic industrial screening level.

Bold text indicates concentration exceeds the migration to groundwater SSL.

Table 16-4
Summary of Inorganic Constituents
Area 14 - Subsurface Debris Area

PARAMETER (mg/kg)	SITE BACKGROUND [1]	GENERIC INDUSTRIAL SCREENING LEVEL [2]	MIGRATION TO GROUNDWATER [3]	LOCATION/DEPTH/SAMPLE DATE		
				SOIL SAMPLES		DEBRIS SAMPLE
				SB-1401	SB-1402	WS-01
				56"	28"	32"
				08/22/97	08/22/97	08/22/97
INORGANICS						
Arsenic	16	38 [a]	29 [f]	11	13	19
Barium	230	14,000	1,600 [f]	39	45	170
Cadmium	3.7	200 [b]	8 [f]	<0.59	<0.58	3.5
Chromium	22	610 [c]	38 [c,f]	14	15	**170**
Lead	20	400 [d]	NA	14	16	220
WET CHEMISTRY						
Cyanide, total	NA	41,000 [e]	40 [g]	NA	NA	NA

[1] Site Background is 2x the mean of the site background samples (see Chpt. 3.2.4).

[2] USEPA Region III Risk-Based Concentration for Industrial Soils dated October 1, 1998 (Risk Target = 10^{-6}; Hazard Index = 0.1).

[3] USEPA Soil Screening Guidance - Technical Background Document, May 1996, DAF = 20.

[a] USEPA Region III Risk-Based Concentration for arsenic in industrial soils based on a target risk of 10^{-5}.

[b] The GISL for cadmium is based on the value for food.

[c] The GISL and SSL for chromium are based on the values for hexavalent chromium.

[d] A screening level of 400 mg/kg has been set for lead based on *Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities* (USEPA, 1994).

[e] The GISL for cyanide is based on the value for potassium silver cyanide.

[f] SSL for pH of 6.8.

[g] The SSL for cyanide is based on the value for amenable cyanide.

< - Concentration less than the Quantitation Limit or not validated is accompanied by "u" qualifier.

NA - Not analyzed; Not available

Shading indicates concentration exceeds both Site Background and the generic industrial screening level.

Bold text indicates concentration exceeds both Site Background and the migration to groundwater SSL.

Section 17
Old Landfill

The Old Landfill is located north of and across the railroad tracks from the closed Industrial Landfill as shown on Plate 2. Aerial photographs from the 1950s indicate that the Old Landfill existed prior to construction of the facility. There is no record as to what was placed there. Subsection 2.5 of the DCC report discusses in detail routine waste generation at the CAWV facility. Waste management practices are summarized in Subsection 2.2 of this report.

17.1 RFI Sampling Program

Two monitoring wells were installed and sampled as part of the RFI to investigate potential releases of hazardous constituents from the Old Landfill to groundwater. The location of the monitoring wells, designated MW-6 and MW-7, are illustrated on Plate 3. These wells were positioned hydraulically downgradient from the Old Landfill. Monitoring wells were installed with 10 feet of well screen positioned to bracket the observed water table. Well construction diagrams of these new wells are included in Appendix G. Monitoring wells were installed and developed in accordance with the procedures outlined in Appendix A of the approved RFI Workplan (Malcolm Pirnie, 1995; RMT, 1995).

Two rounds of groundwater samples were collected from wells MW-6 and MW-7 for the RFI. Round 1 was collected in December 1995; round 2 was collected in August 1997. Groundwater sampling was conducted in accordance with SOP 3 presented in Appendix A of the approved RFI Workplan. Well purging and sampling during round 1 was performed using a teflon bailer. Low rate purging and sampling was performed during round 2 to reduce the amount of suspended solids contained in the samples. The field parameters pH, temperature, specific conductance, and turbidity were measured during the well purging process. The stabilized measurements are included on Table 3-2.

Groundwater samples collected from monitoring wells MW-6 and MW-7 were analyzed for Appendix IX VOCs and SVOCs, total and dissolved RCRA metals, TSS, total cyanide, and weak acid dissociable cyanide. Fluoride and free cyanide (by the microdiffusion method) were added to the list of parameters for the 1997 sampling event. Table 17-1 summarizes the analytical results for detected parameters. Laboratory reports for the 1995 sampling event are provided in Appendix F. Laboratory reports for the 1997 sampling event are provided in Appendix O.

17.2 Discussion of Analytical Results

Hazardous constituents at levels above groundwater screening levels were not substantiated in groundwater downgradient of the Old Landfill. No VOCs met the data validation criteria. BEHP, detected in both wells during the 1995/96 sampling event, was not confirmed during the 1997 sampling event. Total arsenic, barium, cadmium, chromium, and lead detected at levels above the groundwater standards during the 1995/96 sampling event were also not confirmed during the 1997 sampling event. Modifications were made to the sample collection and handling procedures used during the August 1997 sampling event (*i.e.*, the use of BEHP-free gloves and low rate purging and sampling techniques), which have demonstrated that the BEHP and total metals detected in groundwater samples collected during the 1995/1996 RFI were artifacts of the sample collection methodology and were not the result of releases from the Old Landfill.

17.3 Findings and Conclusions for the Old Landfill

- Hazardous constituents have not been released to groundwater downgradient of the Old Landfill.
- Wells MW-6 and MW-7 should be abandoned in accordance with West Virginia regulations.
- No further investigation is warranted.

Table 17-1
Groundwater Quality Summary for the Old Landfill

PARAMETER (mg/L)	GROUND WATER SCREENING LEVEL	LOCATION/SAMPLE DATE			
		MW-6		MW-7	
		12/95	8/97	12/95	8/97
SEMIVOLATILE ORGANICS					
bis(2-Ethylhexyl)phthalate	0.006 [b]	0.004 J	<0.010	0.011	<0.010
INORGANICS					
Arsenic, total		0.33 Ij	<0.004	0.2 j	<0.004
Arsenic, dissolved	0.05 [c]	0.0073	<0.004	<0.005	<0.004
Barium, total		4.8 Ij	0.12	3.7 j	0.11
Barium, dissolved	2.0 [b]	0.092	0.07	0.094	0.09
Cadmium, total		0.033 PIj	<0.01	0.021 j	<0.01
Cadmium, dissolved	0.005 [b]	<0.005	<0.01	<0.005	<0.01
Chromium, total		0.246 PIj	<0.02	0.1 j	<0.02
Chromium, dissolved	0.1 [b]	<0.01	<0.02	<0.01	<0.02
Lead, total		0.3 PIj	<0.005	0.16 j	<0.005
Lead, dissolved	0.015 [b]	<0.003	<0.005	<0.003	<0.005
Mercury, total		0.001	<0.0002	0.00042	<0.0002
Mercury, dissolved	0.002 [b]	<0.0002	<0.0002	<0.0002	<0.0002
Selenium, total		0.021 PIj	<0.004	0.011 j	<0.004
Selenium, dissolved	0.05 [b]	0.01	<0.004	0.015	<0.004
WET CHEMISTRY					
Cyanide, total		<0.01	<0.01	<0.01	<0.01
Cyanide, dissociable	0.2 [c]	<0.01	<0.01	<0.01	<0.01
Cyanide, free		NA	<0.02	NA	<0.02
Fluoride	4.0 [b]	NA	0.20	NA	<0.10
Solids, total suspended	–	3,200	NA	9,300	NA

Groundwater screening levels: [a] Region III Tap Water RBCL; [b] WV Groundwater Standards; [c] Federal SDWA MCLs

I - Estimated concentration due to severe matrix interferences.

j - Concentration considered an estimate based on data validation.

J - Estimated concentration; concentration is less than reporting limit.

P - Digested spike recovery fails accuracy criteria; post-digestion spike recovery accepted.

u - Laboratory reported detection not validated during data validation process.

< - Concentration less than the Quantitation Limit or not validated if accompanied by "u" qualifier.

NA - Not analyzed

Shading indicates value exceeds the groundwater screening level.

Section 18
Industrial Landfill

The Industrial Landfill is located south and west of the Fabrication Plant, east of the Sprayfield, and north of production well F-8 and well F-9, as shown in Plate 3. Disposal of solid wastes in the landfill by KACC was initiated prior to 1960. At that time there were no required construction standards for disposal units; therefore, the landfill was not lined.

Closure of the landfill was initiated in 1987. A clay cap was placed over inactive portions of the landfill. Twenty-eight of the landfill's 34 acres were capped between 1987 and 1989. Capping of the remaining 6 acres was completed and a post-closure application was submitted to the state in 1996. A detailed discussion of the Industrial Landfill is provided in Subsection 16 of the DCC report.

The Industrial Landfill had been used to dispose of wastes from manufacturing processes and other activities at the CAWV facility. The process wastes known to have been previously disposed of in the landfill were not hazardous wastes. Table 18-1 presents the major components expected to be present in materials disposed of in the Industrial Landfill.

Groundwater monitoring has been used for assessing potential releases of hazardous constituents from the Industrial Landfill. Sampling of Industrial Landfill monitoring wells has been performed since 1987. The monitoring was initiated as a requirement of West Virginia Solid Waste/NPDES Water Pollution Control Permit No. IWL-6310-85. Monitoring was performed on a quarterly basis from 1987 through 1996. Since 1997, monitoring has been performed on a semiannual basis. The scope of monitoring has been modified over time to include additional wells and parameters. Currently, groundwater monitoring is conducted on a semiannual basis from wells MW-1R through MW-4, LF-1 through LF-7, and K-209. Groundwater samples are analyzed for fluoride, chloride, nitrate, sulfate, oil & grease, total dissolved solids (TDS), TSS, total organic carbon (TOC), total organic halogen (TOX), dissolved iron, dissolved sodium, dissolved lead, pH, temperature, and specific conductance. Subsection 23.3 of the DCC provides a detailed description of the monitoring activities conducted at the Industrial Landfill. Table 18-2 summarizes the results of groundwater monitoring for hazardous constituents conducted between 1987 and May 1998. Only sampling episodes with one or more detections of a constituent are shown on this table.

Toluene was detected in monitoring well LF-2 (0.006 mg/l) in May 1989. Subsequent sampling events have not detected toluene in this well or the other Industrial Landfill monitoring wells. 1,1-Dichloroethane (1,1-DCA) was detected in monitoring well LF-5 (0.008 mg/l) in May 1994. Subsequent sampling events have not detected 1,1-DCA in this well. 1,1-DCA was detected in well LF-7 from July 1994 to April 1995 at concentrations from 0.008 mg/L to 0.012 mg/L. These concentrations do not exceed the groundwater screening level of 0.08 mg/L.

CAWV began collecting filtered groundwater samples for metals analyses in 1994. Since that time, no dissolved metals have been detected in groundwater samples collected from the Industrial Landfill wells at concentrations above groundwater screening levels.

18.1 RFI Sampling Program

One new and nine existing monitoring wells were sampled as part of the RFI to supplement the groundwater quality data available for Industrial Landfill. Wells MW-1, MW-2, and MW-4, LF-3 through LF-7, and K-209 were sampled during the 1995/96 RFI. During the 1997 RFI, well MW-1 was permanently abandoned and replaced with a new well designated MW-1R. Replacement of this well was performed due to the apparent absence of an impermeable annular seal above the well screen, which may have compromised the quality of the groundwater monitoring data. The locations of these wells are illustrated on Plate 3.

Wells LF-3, LF-6, LF-7, and K-209 monitor the groundwater in the upper silt deposits of the flood plain. Wells LF-4, LF-5, MW-1R (formerly MW-1), MW-2, and MW-4 monitor groundwater quality in the underlying sand and gravel aquifer. Construction information for the existing monitoring wells is provided in Appendix H; construction information for replacement well MW-1R is provided in Appendix N.

Groundwater samples were collected from the nine existing monitoring wells in December 1995. Four of the nine existing wells, LF-3, LF-4, LF-6, and LF-7, were resampled in August 1997. Following installation of new well MW-1R, two rounds of groundwater samples were collected in August and October 1997. Groundwater sampling was conducted in accordance with SOP 3 presented in Appendix A of the approved RFI Workplan. Except for monitoring well LF-5, well purging and sampling was performed using the low rate procedure. Well purging and sampling in well LF-5 was performed using a teflon bailer. The field parameters pH, temperature, turbidity, and specific conductance were measured during the well purging process. The stabilized measurements are included on Table 3-2.

In addition to collection and analysis of groundwater samples, the periphery of the landfill was inspected for seeps during the 1995/96 RFI. No seeps were identified. CAWV personnel routinely inspect the cover while mowing the area.

Groundwater samples collected from the nine existing Industrial Landfill monitoring wells in 1995 were analyzed for Appendix IX VOCs and SVOCs, total and dissolved RCRA metals, TSS, total cyanide, and weak acid dissociable cyanide. Groundwater samples collected from the four existing monitoring wells resampled in 1997 were analyzed for total cyanide, weak acid dissociable cyanide, and free cyanide by the microdiffusion method. Both rounds of groundwater samples collected from new well MW-1R were analyzed for Appendix IX VOCs and SVOCs, total and dissolved RCRA metals, total cyanide, weak acid dissociable cyanide, and free cyanide by the microdiffusion method. Table 18-3 summarizes the analytical results for the RFI samples. Laboratory reports for the 1995 sampling event are provided in Appendix F. Laboratory reports for the 1997 sampling event are provided in Appendix O.

18.2 Discussion of Analytical Results

Hazardous constituents at levels above groundwater screening levels were not substantiated in the wells monitoring the Industrial Landfill. Although BEHP and 1,4-dioxane were detected in well MW-1 at concentrations above groundwater screening levels during the 1995 sampling event, these constituents were not detected in samples collected from replacement well MW-1R during the 1997 sampling events. The use of BEHP-free gloves during the 1997 sampling events has demonstrated that BEHP detected in groundwater at the Sprayfield (Subsection 11.2.2) and the Old Landfill (Subsection 17.2) during the 1995/96 sampling events were artifacts of the sample collection methodology, and were not due to releases from those units. The same is believed true of the BEHP detected in well MW-1 during the 1995 sampling event. The concentration of 1,4-dioxane reported in well MW-1 in 1995 was an estimated concentration below the reporting limit. 1,4-Dioxane was not detected in MW-1R in 1997. Groundwater quality results from samples collected from replacement well MW-1R, located downgradient of the landfill, show no concentrations of hazardous constituents above groundwater screening levels.

18.3 Findings and Conclusions for the Industrial Landfill

- Hazardous constituents at levels above groundwater screening levels are not present in the wells monitoring the Industrial Landfill.
- Groundwater monitoring is continuing under the solid waste permit.
- No further action is warranted for this area.

Table 18-1
Major Components of Landfilled Wastes

WASTE	MAJOR COMPONENTS
Anode waste	Coke, pitch, low concentrations of fluoride
Carbon plant baghouse dust	Coke, pitch
Waste dust	Sweepings from all over the plant
Flue brick, furnace brick, crucible brick, floor brick	Clays, low concentrations of chromium
Debris	Concrete rubble, cement, broken brick, broken pallets, wood, cloth, cardboard
Arc furnace dross and baghouse dust	Carbon, heavy metals less than characteristically hazardous levels
Wet or contaminated alumina	Aluminum oxide, fluoride, dirt
Baghouse bags and filters	Fabric, fluoride-reacted alumina dust
Rotary barrel furnace dross	Metal salts that leach less than characteristically hazardous levels
Induction furnace baghouse dust	Fine carbon particulates
Demineralization resins	Inert complex organics (plastics)
Diatomaceous earth	Calcium carbonate, residual oil, fine metal particles
Used filter paper	Paper, residual oil, fine metal particles
Scrap iron (when not recycled)	Iron and alloying metals
Steel and wire, welding rodstubs	Steel and alloying metals
Sample residues	Coke, pitch, alumina, bath
Broken glassware and laboratory equipment	Glass, plastic, rubber, metal
General solid wastes such as office waste	Paper, plastic, metal
Lunchroom waste	Paper, plastic, food
Construction/demolition debris	Concrete, metal, brick, dirt
Oily rags	Fabric, residual oil, fine metal particles, dirt
Air and oil filters from vehicles	Paper, metal, plastic, residual oil, dirt
Other vehicle parts	Paper, metal, plastic

Table taken from Malcolm Pirnie, 1995; RMT, 1996

Table 18-2
Historical Groundwater Quality Summary for the Industrial Landfill

Chemical Group	Date Sampled	Industrial Landfill Wells											
		MW-1	MW-2	MW-3	MW-4	LF-1	LF-2	LF-3	LF-4	LF-5	LF-6	LF-7	K-209
ORGANICS													
1,1-Dichloroethane	05/19/94	NA	NA	NA	NA	<0.002	<0.002	<0.002	<0.002	0.008	<0.002	<0.002	<0.002
	07/14/94	NA	NA	NA	NA	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.012	<0.002
	10/31/94	NA	NA	NA	NA	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.012	<0.002
	01/26/95	NA	NA	NA	NA	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.008	<0.002
	04/27/95	NA	NA	NA	NA	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.009	<0.002
Toluene	05/30/89	<1.0	<1.0	<1.0	<1.0	<1.0	0.006	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
INORGANICS													
Arsenic	04/05/91	0.17	<0.05	<0.05	0.14	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
	09/12/96	0.064	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Arsenic, Dissolved	07/28/95	<0.05	<0.05	<0.05	<0.05	0.051	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Lead, Total	03/15/89	<0.015	<0.015	<0.015	<0.015	0.02	0.03	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
	05/25/89	<0.015	<0.015	0.086	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
	06/13/89	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	0.04
	08/14/89	<0.015	<0.015	0.02	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
	08/16/89	<0.015	<0.015	<0.015	<0.015	<0.015	0.079	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
	11/01/89	<0.015	<0.015	0.09	<0.015	0.09	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
	04/16/90	<0.015	<0.015	<0.015	<0.015	0.1	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
	09/17/90	<0.015	<0.015	<0.015	<0.015	0.07	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
	09/18/90	<0.015	<0.015	<0.015	<0.015	<0.015	0.05	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
	07/14/92	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	0.043

< - Concentration less than the Quantitation Limit.
Shading indicates sample exceeds Groundwater Screening Level.

Table 18-3
Groundwater Quality Summary for the Industrial Landfill

PARAMETER (mg/L)	GROUND WATER SCREENING LEVEL	LOCATION/SAMPLE DATE						
		LF-3		LF-4		LF-5	LF-6	
		12/95	8/97	12/95	8/97	12/95	12/95	8/97
VOLATILE ORGANICS								
Acetone	0.37 [a]	<0.01	NA	<0.009 QBu	NA	<0.004 QBu	<0.01	NA
1,1-Dichloroethane	0.08 [a]	<0.005	NA	<0.005	NA	<0.005	<0.005	NA
SEMIVOLATILE ORGANICS								
1,4-Dioxane	0.0061 [a]	<0.02	NA	<0.02	NA	<0.02	<0.02	NA
bis(2-Ethylhexyl)phthalate	0.006 [b]	0.003 J	NA	<0.01	NA	<0.01	<0.01	NA
INORGANICS								
Arsenic, total	0.05 [c]	<0.005	NA	<0.005	NA	0.0074	<0.005	NA
Arsenic, dissolved		0.0064	NA	<0.005	NA	<0.005	<0.005	NA
Barium, total	2.0 [b]	0.087 j	NA	0.12	NA	0.16	0.064	NA
Barium, dissolved		0.092	NA	0.13	NA	0.085	0.067	NA
Lead, total	0.015 [b]	0.005 j	NA	<0.003	NA	0.0065	<0.003	NA
Lead, dissolved		<0.003	NA	<0.003	NA	<0.003	<0.003	NA
Selenium, total	0.05 [b]	0.0059 j	NA	<0.005	NA	<0.005	<0.005	NA
Selenium, dissolved		0.029	NA	0.0056	NA	0.012	0.0091	NA
WET CHEMISTRY								
Cyanide, total		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cyanide, dissociable	2.0 [c]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cyanide, free		NA	<0.02	NA	<0.02	NA	NA	<0.02
Fluoride	4.0 [b]	NA	NA	NA	NA	NA	NA	NA
Solids, total suspended	--	<10	NA	<10	NA	320	<10	NA

Groundwater screening levels:
(a) Region III Tap Water
(b) WV Groundwater Standard
(c) Federal SDWA MCL
NA - Not analyzed
Shading indicates value exceeds the groundwater screening level.

B (organic) - Present in analytical method blank.
j - Concentration considered an estimate based on data validation.
J - Estimated concentration; concentration is less than reporting limit.
Q - Qualitative mass spectral evidence of analyte present; concentration is less than reporting limit.
u - Laboratory reported detection not validated during data validation process.
< - Concentration less than the Quantitation Limit or not validated if accompanied by "u" qualifier.

Table 18-3
Groundwater Quality Summary for the Industrial Landfill

PARAMETER (mg/L)	GROUND WATER SCREENING LEVEL	LOCATION/SAMPLE DATE								
		LF-7		MW-1		MW-1R			MW-2	MW-4
		12/95	8/97	12/95	(DU-W01) 12/95	8/97	(DU-02) 8/97	10/97	12/95	12/95
VOLATILE ORGANICS										
Acetone	0.37 [a]	<0.004 Qu	NA	<0.003 QBu	<0.005 QBu	0.120	0.120	<0.100	<0.002 QBu	<0.01 Bu
1,1-Dichloroethane	0.08 [a]	0.0072	NA	0.0062	0.0061	<0.005	<0.005	<0.005	<0.005	<0.005
SEMIVOLATILE ORGANICS										
1,4-Dioxane	0.0061 [a]	<0.02	NA	0.01J	0.01 J	<0.100	<0.100	<0.100	<0.02	<0.02
bis(2-Ethylhexyl)phthalate	0.006 [b]	<0.01	NA	0.018	0.03	<0.010	<0.010	<0.011	0.005 J	0.005 J
INORGANICS										
Arsenic, total	0.05 [c]	<0.005	NA	<0.005	<0.005	<0.004	<0.004	0.033	<0.005	<0.005
Arsenic, dissolved		<0.005	NA	<0.005	0.0095	<0.004	<0.004	0.029	0.01	<0.005
Barium, total	2.0 [b]	<0.05	NA	0.13j	0.13 j	0.16	0.15	0.21	0.092 j	0.087 j
Barium, dissolved		0.051	NA	0.13	0.13	0.14	0.13	0.21	0.092	0.094
Lead, total	0.015 [b]	<0.003	NA	<0.003	<0.003	<0.005	<0.005	<0.005	0.0039 j	<0.003
Lead, dissolved		0.0034	NA	<0.003	<0.003	<0.005	<0.005	<0.005	<0.003	<0.003
Selenium, total	0.05 [b]	0.0075	NA	<0.005	<0.005	<0.004	<0.004	<0.004	0.0063 j	<0.005
Selenium, dissolved		0.034	NA	0.034	0.022	<0.004	<0.004	<0.01	0.026	0.0068
WET CHEMISTRY										
Cyanide, total		0.07	0.10	0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cyanide, dissociable	2.0 [c]	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cyanide, free		NA	<0.02	NA	NA	<0.02	<0.02	<0.02	NA	NA
Fluoride	4.0 [b]	NA	0.10	NA	NA	<0.10	<0.10	0.10	NA	NA
Solids, total suspended	--	<10	NA	10	16	NA	NA	NA	11	17

Groundwater screening levels:
(a) Region III Tap Water
(b) WV Groundwater Standard
(c) Federal SDWA MCL
NA - Not analyzed
Shading indicates value exceeds the groundwater screening level.

B (organic) - Present in analytical method blank.
j - Concentration considered an estimate based on data validation.
J - Estimated concentration; concentration is less than reporting limit.
Q - Qualitative mass spectral evidence of analyte present; concentration is less than reporting limit.
u - Laboratory reported detection not validated during data validation process.
< - Concentration less than the Quantitation Limit or not validated if accompanied by "u" qualifier.

Section 19
Interceptor Basins

Interceptor basins are provided for three of the facility's NPDES outfalls. Interceptor Basin 001 is a 20,000-gallon concrete tank. Interceptor Basins 002 and 004 are earthen basins. The purpose of the interceptor basins is to provide secondary containment in the event that a major spill occurred at the facility. Each interceptor basin is also equipped with oil skimming equipment. Additionally, suspended solids carried by storm water runoff are captured in the interceptor basins.

19.1 Interceptor Basin 002

The 002 Interceptor Basin was constructed in the mid 1970s. The basin has a capacity of 870,000 gallons and has oil skimming equipment. The basin was bentonite-lined at the time of its construction. Sediments collected in the basin were removed in 1989 in association with the transfer of the property from KACC to CAWV. The bentonite liner was restored upon removal of the sediment. The sediment was tested for hazardous characteristics prior to disposal in the on-site Industrial Landfill. Barium was detected at a concentration of 0.07 mg/L in a TCLP analysis of the sediment. No other hazardous constituents were detected. The results of the sampling are presented in the DCC report.

19.1.1 RFI Sampling Program

Monitoring well MW-5, installed during the 1995/96 RFI to evaluate the extent of floating oil at the Oil Recovery Ponds, was sampled during the 1997 RFI to assess groundwater quality downgradient of Interceptor Basin 002. The location of MW-5 is illustrated on Plate 3. Two rounds of groundwater samples were collected and analyzed from this well. Round 1 was collected in August 1997; round 2 was collected in October 1997. Groundwater sampling was conducted in accordance with Appendix A of the approved RFI Workplan using the low rate purging and sampling methodology. The field parameters pH, temperature, turbidity, and specific conductance were measured during the well purging process. The stabilized measurements are presented on Table 3-2.

Groundwater samples collected from well MW-5 were analyzed for Appendix IX VOCs and SVOCs, total and dissolved RCRA metals, fluoride, total cyanide, weak acid dissociable cyanide, and free cyanide by the microdiffusion method. Table 19-1 summarizes the analytical results. Laboratory reports are provided in Appendix O.

19.1.2 Discussion of Analytical Results

No VOCs or SVOCs were detected in the groundwater samples collected from MW-5. Barium and fluoride were detected at levels well below groundwater screening levels. Arsenic, detected only during the October 1997 sampling event, was present at a concentration below its groundwater screening level. Total cyanide was detected at concentrations of 0.01 mg/L and 0.02 mg/L, respectively. There is no groundwater screening level for total cyanide. Weak acid dissociable cyanide and free (microdiffusion) cyanide were not detected.

19.1.3 Findings and Conclusions for Interceptor Basin 002

- Hazardous constituents have not been released to groundwater downgradient of Interceptor Basin 002.
- No further investigation or action is warranted.

19.2 Interceptor Basin 004

The 004 Interceptor Basin was constructed in the mid 1970s. The basin has a capacity of 1,222,000 gallons and is equipped with oil skimming equipment. The basin was bentonite-lined at the time of its construction. Sediments collected in the basin were removed in 1989, in association with the transfer of the property from KAAC to CAWV, and again in 1995. The bentonite liner was restored upon removal of the sediment. The sediment was tested for hazardous characteristics prior to disposal. Sediment samples collected in 1989 contained barium (0.18 mg/L in the TCLP extract) and benzo(a)pyrene (200 mg/kg and 370 mg/kg). The sediment samples collected in 1995 contained barium (0.6 mg/L in the TCLP extract). The 1995 sediment sample also contained several total metals, total cyanide, and oil & grease. The results of the sampling are presented in Table 22-6, Table 22-7, and Appendix A-2 of the DCC report.

19.2.1 RFI Sampling Program

One new monitoring well was installed near the southeast corner of Interceptor Basin 004 to assess groundwater quality downgradient of the basin. The location of the well, designated MW-9, is illustrated on Plate 3. Well MW-9 was constructed with 10 feet of well screen positioned across the observed water table. The boring log and well construction diagram are provided in Appendix L and Appendix N, respectively.

Two rounds of groundwater samples were collected and analyzed from this well. Round 1 was collected in August 1997; round 2 was collected in October 1997. Groundwater sampling was conducted in accordance with Appendix A of the approved RFI Workplan using the low rate purging and sampling methodology. The field parameters pH, temperature, turbidity, and specific conductance were measured during the well purging process. The stabilized measurements are included on Table 3-2.

Groundwater samples collected from well MW-9 were analyzed for Appendix IX VOCs and SVOCs, total and dissolved RCRA metals, fluoride, total cyanide, weak acid dissociable cyanide, and free cyanide by the microdiffusion method. Table 19-1 summarizes the analytical results. Laboratory reports are provided in Appendix O.

19.2.2 Discussion of Analytical Results

No VOCs were detected in the groundwater samples collected from MW-9. One SVOC, BEHP, was detected at a concentration of 0.015 mg/L during the October 1997 event. This constituent was not detected during the August 1997 event. The ubiquitous nature of this compound in materials (*i.e.*, plastic and latex) used extensively in sample collection and handling practices, coupled with the inconsistent detection of this compound in the groundwater samples, indicates that the BEHP detection in well MW-9 does not represent a release from the interceptor basin.

Barium was detected in the groundwater samples collected from MW-9 at levels well below the groundwater screening level. No other metals were detected. Fluoride, which is not a hazardous constituent, was detected at concentrations above its groundwater screening level during both sampling events. Cyanide was not detected.

19.2.3 Summary of Findings for the Interceptor Basin 004

- Hazardous constituents have not been released to groundwater downgradient of Interceptor Basin 004.
- Fluoride was detected in groundwater samples collected from well MW-9 at concentrations above the groundwater screening level. Fluoride is not a hazardous constituent.
- No further RFI-related activities are warranted.

Table 19-1
Groundwater Quality Summary for Interceptor Basins 002 and 004

PARAMETER (mg/L)	GROUND WATER SCREENING LEVEL	LOCATION/SAMPLE DATE			
		INTERCEPTOR BASIN 002		INTERCEPTOR BASIN 004	
		MW-5		MW-9	
		8/97	10/97	8/97	10/97
SEMIVOLATILE ORGANICS					
bis(2-Ethylhexyl)phthalate	0.006 [b]	<0.010	<0.010	<0.010	0.015
INORGANICS					
Arsenic, total		<0.004	0.017	<0.004	<0.004
Arsenic, dissolved	0.05 [c]	<0.004	0.022	<0.004	<0.004
Barium, total		0.11	0.09	0.14	0.15
Barium, dissolved	2.0 [b]	0.09	0.09	0.12	0.14
WET CHEMISTRY					
Cyanide, total		0.01	0.02	<0.01	<0.01
Cyanide, dissociable	0.2 [c]	<0.01	<0.01	<0.01	<0.01
Cyanide, free		<0.02	<0.02	<0.02	<0.02
Fluoride	4.0 [b]	0.2	0.3	11	15

Groundwater screening levels: [a] Region III Tapwater RBCL; [b] WV Groundwater Standards; [c] Federal SDWA MCLs
< - Concentration less than the Quantitation Limit
Shading indicates value exceeds the groundwater screening level.

Section 20
Groundwater Quality in Areas of Former Potliner Management

Prior to 1979, spent potliner was managed and accumulated outside at the facility. This practice resulted in the leaching of cyanide from the potliner into the groundwater from certain Areas of Former Potliner Management. These areas include the Old Northwest Pot Dump, Pot Soaking Piers, Pot Soaking Pits and Elephant Shed, Potliner Loadout Area, and the Potliner Pile. In 1969, the presence of total cyanide in some of the facility wells was discovered. At that time, an effort was undertaken to control the migration of cyanide in groundwater.

Various groundwater pumping wells have been used to control groundwater flow and to contain and remove the cyanide present in groundwater. These recovery wells are referred to as Blocking Wells and are described in Subsection 23.1.2 of the DCC. Currently the blocking well system is comprised of wells R-1, R-2, R-3, R-4, F-1, and F-10. Groundwater is extracted from these wells at a combined rate of approximately 2 mgd to 2.4 mgd, and is discharged to the Ohio River through Outfall 004 in accordance with CAWV's NPDES Permit.

20.1 Groundwater Monitoring Programs

Pumping of the Blocking Wells has created a large cone of depression in the groundwater system that captures groundwater beneath the northern and central portions of the facility, including the areas of former potliner management. Monitoring of groundwater quality in the areas of former potliner management is currently being conducted. Table 20-1 summarizes CAWV's monitoring program. In 1997, as part of the RFI, CAWV added weak acid dissociable cyanide and free cyanide to the monitoring parameters for the D&M wells and added weak acid dissociable cyanide to the monitoring parameters for the Blocking Wells. The results of these sampling events are documented in the 1998 Annual Monitoring Report (*Arcadis* G&M, 1999).

Monitoring of groundwater quality in the vicinity of the Potliner Vault is also being performed by KACC under their State Water Pollution permit. KACC collects groundwater samples on a quarterly basis from wells W-1, W-2, and W-3, and analyses samples for total cyanide, fluoride, chloride, sodium, TDS, TSS, pH, and temperature. Groundwater samples are analyzed annually for nitrate-nitrite, aluminum, and total iron. Monitoring results are provided by KACC to WV DEP.

20.2 KACC RFI Sampling and Analyses

In 1996, KACC installed three monitoring wells, SPL-1, SPL-2, and SPL-3, in the vicinity of the Potliner Pile. These wells were installed as a result of KACC's separate consent Order and were sampled three times in 1996 and once in 1997 for total cyanide, weak acid dissociable cyanide, free cyanide by the microdiffusion method, and fluoride. The results of these analyses were included in KACC's RFI Report submitted to USEPA (CEC, 1997). Results of these analyses are summarized on Table 20-2. Total cyanide, weak acid dissociable cyanide, and fluoride were detected in each of the monitoring wells during each of the sampling events. Free cyanide was detected in well SPL-2 in a filtered sample collected in September 1996; free cyanide was not detected in the unfiltered sample collected from this well.

20.3 CAWV RFI Sampling and Analyses

Groundwater samples collected from wells located at the Old Landfill, Industrial Landfill, Sprayfield, and Interceptor Basins 002 and 004 for the RFI were analyzed for total cyanide, weak acid dissociable cyanide, free cyanide by the microdiffusion method, and fluoride. The results are summarized on Table 20-3. Total cyanide was detected in groundwater samples at concentrations ranging from 0.01 mg/L to 0.23 mg/L. Weak acid dissociable cyanide and free cyanide were not detected. Fluoride was detected at concentrations ranging from 0.10 mg/L to 15 mg/L. Concentrations of fluoride in monitoring well MW-9 exceeded its groundwater screening level.

20.4 Data Evaluation

Plate 8 illustrates the distribution of total cyanide, weak acid dissociable cyanide, and free cyanide in monitoring wells sampled throughout the site in August 1997. These data include results of analyses performed for CAWV's RFI, under CAWV's routine monitoring programs, and for KACC's RFI. This plate illustrates that the highest concentrations of cyanide remain in the areas of former potliner management.

As agreed during the December 1996 meeting in Philadelphia, USEPA plans to base corrective measures decisions on weak acid dissociable cyanide. The groundwater screening level for free cyanide, based on its Federal Primary Drinking Water Standard, is 0.2 mg/L.

Table 20-2 shows that wells SPL-1 and SPL-3, located adjacent to the Potliner Pile, contained weak acid dissociable cyanide above the standard in August and September 1996. Figure 20-1 graphically illustrates the concentrations of weak acid dissociable cyanide in the D&M wells and blocking wells between January 1997 and May 1998. During this time period, well DM-5, located near the northeast corner of the Old Northwest Pot Dump, exceeded the groundwater screening level in March, April, and May 1997. Well DM-8, located south of the drainage path

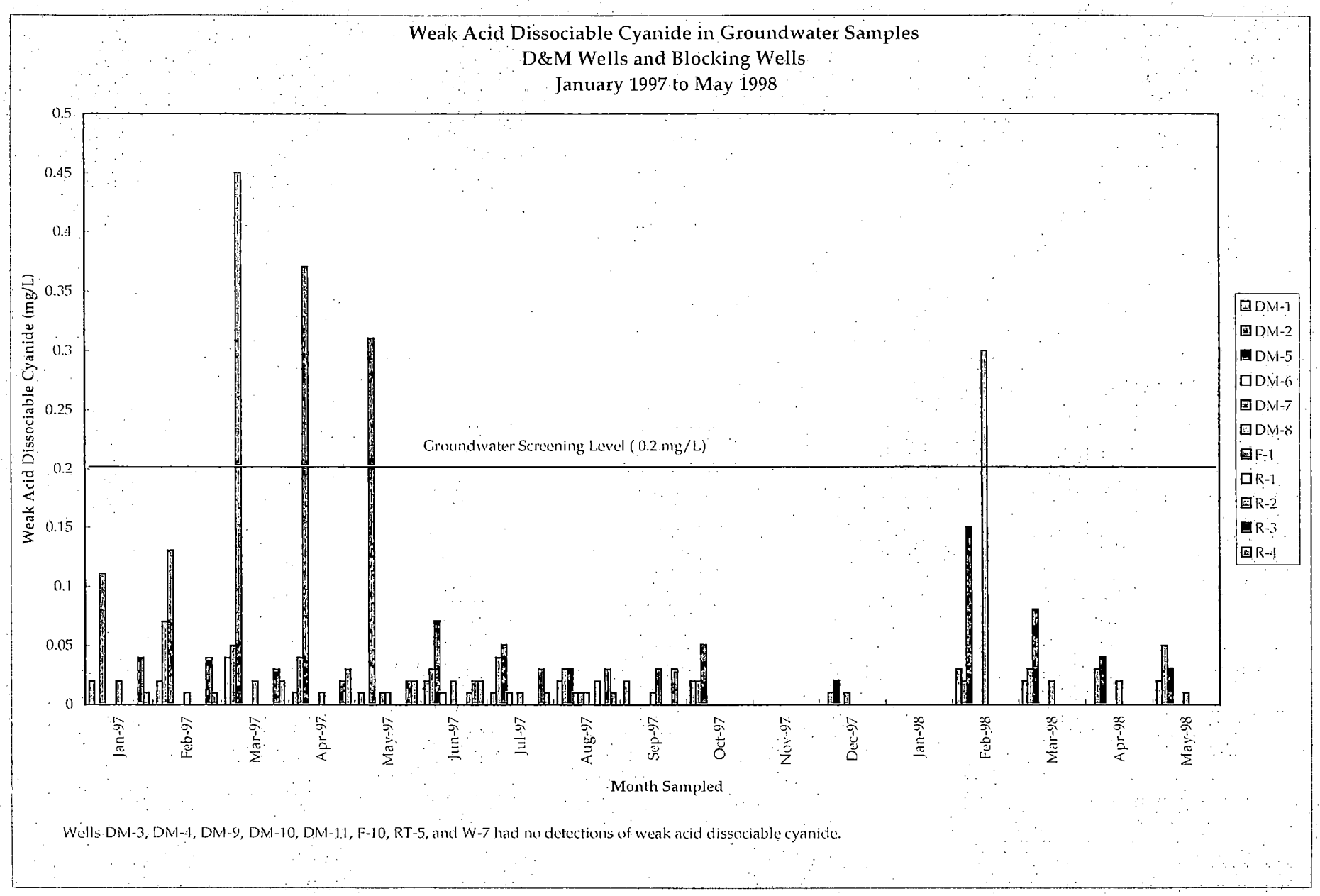
from the Old Northwest Pot Dump, exceeded the groundwater screening level in February 1998. No other exceedences of the groundwater screening level were observed.

Appendix Q contains graphs illustrating the concentrations of total cyanide and free cyanide present in the blocking wells from 1985 to May 1998. Weak acid dissociable cyanide was included beginning in 1997. These graphs show few detections of free cyanide or weak acid dissociable cyanide.

Although fluoride is not a hazardous constituent, USEPA required it to be included in the groundwater evaluation. The groundwater screening level for fluoride, based on the West Virginia groundwater standards, is 4.0 mg/L. Well MW-9, located near Interceptor Basin 004, and SPL-2, located near the Potliner Pile, exceeded this screening level in August and October 1997. Wells SPL-1 and SPL-3, located near the Potliner Pile, exceeded the screening level in August and September 1996. Well SPL-2 exceeded the screening level in August 1997.

20.5 Conclusions

- Cyanide and fluoride are present in groundwater at concentrations above screening levels. Monitoring of the cyanide is being conducted. Fluoride is not a hazardous constituent and is not monitored on a routine basis.
- The highest concentrations of cyanide remain in the areas of former potliner management. The blocking well system continues to recover cyanide and control the direction of groundwater flow. Although fluoride is not regulated under the RCRA program, operation of the blocking well system controls the migration of fluoride as well.



Wells DM-3, DM-4, DM-9, DM-10, DM-11, F-10, RT-5, and W-7 had no detections of weak acid dissociable cyanide.

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Figure 20-1

Century Aluminum of West Virginia
December 1999

Table 20-1
Former Potliner Management Area
Groundwater Monitoring Program

WELL ID	FREQUENCY MONITORED	MONITORING PARAMETERS
R-1 R-2 R-3 R-4 F-1 F-10	Monthly	1985 to present: Total cyanide, free cyanide, fluoride 1997: added weak acid dissociable cyanide
DM-1 through DM-11[1] RT-5	Quarterly to bimonthly (1984 through 1996) Monthly (1997 to present)	1984 to present: Total cyanide, fluoride, chloride, TDS, sodium, pH, conductivity & temperature 1997: added weak acid dissociable cyanide and free cyanide (microdiffusion)

(1) DM-6 is also referred to as W-1; DM-11 is also referred to as MW-1. MW-1 was abandoned in August 1997 and replaced with new well MW-1R.

Table 20-2
Summary of KACC RFI Groundwater Analyses[1]

PARAMETER[2]	Location/Position/Sample Date							
	SPL-1 DOWNGRADIENT				SPL-2 DOWNGRADIENT			
	May-96	August-96	September-96	August-97	May-96	August-96	September-96	August-97
Total Cyanide, Unfiltered	5.3	6.3	11	13	4.0	3.4	3.9	4.4
Total Cyanide, Filtered	NA	NA	15	NA	NA	NA	4.3	NA
Weak Acid Dissociable Cyanide, Unfiltered	0.14	0.3	0.2	0.12	0.11	0.14	0.17	0.07
Weak Acid Dissociable Cyanide, Filtered	NA	NA	0.25	NA	NA	NA	0.13	NA
Free Cyanide by Microdiffusion, Unfiltered	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Free Cyanide by Microdiffusion, Filtered	NA	NA	<0.02	NA	NA	NA	0.05	NA
Fluoride, Unfiltered	2.9	4.8	5.5	3.4	3.3	3.7	3.9	4.5
Fluoride, Filtered	NA	NA	4.7	NA	NA	NA	4.0	NA

PARAMETER[2]	Location/Position/Sample Date			
	SPL-3 UPGRADIENT			
	May-96	August-96	September-96	August-97
Total Cyanide, Unfiltered	7.9	6.2	9.5	2.9
Total Cyanide, Filtered	NA	NA	6.3	NA
Weak Acid Dissociable Cyanide, Unfiltered	0.09	0.29	0.21	0.05
Weak Acid Dissociable Cyanide, Filtered	NA	NA	0.24	NA
Free Cyanide by Microdiffusion, Unfiltered	<0.02	<0.02	<0.02	<0.02
Free Cyanide by Microdiffusion, Filtered	NA	NA	<0.02	NA
Fluoride, Unfiltered	3.8	4.4	4.1	3.0
Fluoride, Filtered	NA	NA	4.8	NA

[1] Data obtained from KACC, 1997.

[2] Analytical results are reported in milligrams per liter (mg/L) unless otherwise noted.

NA - Not analyzed

Shading indicates concentration meets or exceeds the 0.2 mg/L groundwater standard.

Table 20-3
Groundwater Quality Summary for Cyanide and Fluoride

LOCATION	SAMPLE DATE	PARAMETER (mg/L)/SCREENING LEVEL			
		CYANIDE, TOTAL	CYANIDE, DISSOCIABLE	CYANIDE, FREE	FLUORIDE
			0.2 [b]		4.0 [a]
SPRAYFIELD					
K-201	8/97	0.01	<0.01	<0.02	NA
K-203	8/97	<0.01	<0.01	<0.02	NA
K-207	8/97	0.23	<0.01	<0.02	<0.10
K-208	8/97	<0.01	<0.01	<0.02	NA
K-209	12/95	<0.01	<0.01	NA	NA
	8/97	<0.01	<0.01	<0.02	NA
MW-8D	8/97	0.02	<0.01	<0.02	<0.10
MW-8S	8/97	<0.01	<0.01	<0.02	0.10
INDUSTRIAL LANDFILL					
LF-3	12/95	<0.01	<0.01	NA	NA
	8/97	<0.01	<0.01	<0.02	NA
LF-4	12/95	<0.01	<0.01	NA	NA
	8/97	<0.01	<0.01	<0.02	NA
LF-5	12/95	<0.01	<0.01	NA	NA
LF-6	12/95	<0.01	<0.01	NA	NA
	8/97	<0.01	<0.01	<0.02	NA
LF-7	12/95	0.07	<0.01	NA	NA
	8/97	0.10	<0.01	<0.02	0.10
MW-1	12/95	0.01	<0.01	NA	NA
(DU-W01)	12/95	0.01	<0.01	NA	NA
MW-1R	8/97	<0.01	<0.01	<0.02	<0.10
(DU-02)	8/97	<0.01	<0.01	<0.02	<0.10
	10/97	<0.01	<0.01	<0.02	0.10
MW-2	12/95	<0.01	<0.01	NA	NA
MW-4	12/95	<0.01	<0.01	NA	NA
OLD LANDFILL					
MW-6	12/95	<0.01	<0.01	NA	NA
	8/97	<0.01	<0.01	<0.02	0.20
MW-7	12/95	<0.01	<0.01	NA	NA
	8/97	<0.01	<0.01	<0.02	<0.10
INTERCEPTOR BASIN 002					
MW-5	8/97	0.01	<0.01	<0.02	0.2
	10/97	0.02	<0.01	<0.02	0.3
INTERCEPTOR BASIN 004					
MW-9	8/97	<0.01	<0.01	<0.02	11
	10/97	<0.01	<0.01	<0.02	15

Groundwater screening levels: [a] WV Groundwater Standards; [b] Federal SDWA MCLs
< - Concentration less than the Quantitation Limit or not validated if accompanied by "u" qualifier.
NA - Not analyzed
Shading indicates value exceeds the groundwater screening level.

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